

Serial No.: 10/678,690
Amendment dated: September 2, 2005
Reply to Office Action of: May 4, 2005
Atty. Docket No.: JJK-0331 (P2002J100)

LISTING OF CLAIMS

1. (currently amended) A process for catalytically dewaxing a waxy mineral hydrocarbon feed which comprises:
 - (a) contacting a dewaxing catalyst which functions by isomerizing waxy molecules with a stream containing 100 wppm to 10000 wppm of at least one oxygenate at a temperature of from 120 to 400°C and a hydrogen pressure of from 101 to 20786 kPa wherein the catalyst is selectively activated; and
 - (b) contacting the catalyst from step (a) with waxy hydrocarbon feed and dewaxing the waxy hydrocarbon feed under conditions effective to catalytically dewax the waxy hydrocarbon feed.
2. (original) The process of claim 1 wherein the waxy hydrocarbon feed contains at least about 15 wt.% wax, based on feed.
3. (original) The process of claim 1 wherein the dewaxing catalyst contains at least one molecular sieve containing at least one 10 or 12 ring channel.
4. (original) The process of claim 3 wherein the molecular sieve is at least one of ZSM-5, ZSM-11, ZSM-22, ZSM-23, ZSM-35, ZSM-48, ZSM-57, ferrierite, EU-1, NU-87, SAPO-11, SAPO-41, ITQ-13 or MCM-71.
5. (original) The process of claim 3 wherein the molecular sieve is at least one of zeolite beta, ZSM-12, MCM-68, SAPO-5, SAPO-31, MAPO-36, ZSM-18, offretite, mordenite or faujasite.
6. (original) The process of claim 4 wherein the molecular sieve is ZSM-48.

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7. (original) The process of claim 1 wherein the oxygenate is at least one alcohol, carboxylic acid, ester, aldehyde, ketone or ether.

8. (original) The process of claim 1 wherein the oxygenate is water.

9. (original) The process of claim 1 wherein the oxygenate is present in an amount of at least 100 wppm, measured as oxygen.

10. (original) The process of claim 1 wherein catalytic dewaxing of hydrocarbon feed results in improved yield of isomerate boiling in the lube oil range at equivalent pour over the dewaxing catalyst without oxygenate treatment.

11. (original) The process of claim 10 wherein the improved yield is at least 4 relative percent.

12. (original) The process of claim 1 wherein the conditions effective to catalytically dewax the feed include a temperature of from 250 to 400°C, a pressure of from 791 to 20786 kPa, a liquid hourly space velocity of from 0.1 to 10 hr⁻¹ and a treat gas rate of from 45 to 1780 m³/m³.

13. (original) The process of claim 1 wherein the dewaxing catalyst is sulfided, reduced, or sulfided and reduced.

14. (original) The process of claim 1 wherein the dewaxing catalyst bears a metal hydrogenation component.

15. (original) The process of claim 14 wherein the metal hydrogenation component is at least one Group 9 or 10 noble metal.

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16. (currently amended) A process for catalytically dewaxing a mineral hydrocarbon feed containing at least about 15 wt.% wax, based on hydrocarbon feed, which comprises:

(a) contacting a dewaxing catalyst which functions by isomerizing waxy molecules and which is at least one molecular sieve containing at least one 10 or 12 ring channel with a stream containing at least about 100 wppm to 10000 wppm, measured as oxygen, of at least one oxygenate at a temperature of from 120 to 400°C, a hydrogen pressure of from 791 to 20786 kPa wherein the catalyst is selectively activated; and

(b) contacting the catalyst from step (a) with the hydrocarbon feed and dewaxing the hydrocarbon feed under conditions effective to catalytically dewax the hydrocarbon feed.

17. (original) The process of claim 16 wherein the molecular sieve is at least one of ZSM-5, ZSM-11, ZSM-22, ZSM-23, ZSM-35, ZSM-48, ZSM-57, ferrierite, EU-1, NU-87, SAPO-11, SAPO-41, ITQ-13 or MCM-71.

18. (original) The process of claim 16 wherein the molecular sieve is at least one of zeolite beta, ZSM-12, MCM-68, SAPO-5, SAPO-31, MAPO-36, ZSM-18, offretite, mordenite or faujasite.

19. (original) The process of claim 17 wherein the molecular sieve is ZSM-48.

20. (original) The process of claim 16 wherein the conditions effective to catalytically dewax the feed include a temperature of from 250 to 400°C, a pressure of from 791 to 20786 kPa, a liquid hourly space velocity of from 0.1 to 10 hr⁻¹ and a treat gas rate of from 45 to 1780 m³/m³.

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21. (original) The process of claim 16 wherein catalytic dewaxing of a mineral based hydrocarbon feed results in improved yield of isomerate boiling in the lube oil range at equivalent pour over the dewaxing catalyst without oxygenate treatment.

22. (original) The process of claim 21 wherein the improved yield is at least 4 relative percent.

23. (original) The process of claim 16 wherein the oxygenate is at least one alcohol, carboxylic acid, ester, aldehyde, ketone or ether.

24. (original) The process of claim 16 wherein the oxygenate is water.

25. (original) The process of claim 16 wherein the dewaxing catalyst is sulfided, reduced, or sulfided and reduced.

26. (original) The process of claim 16 wherein the dewaxing catalyst bears a metal hydrogenation component.

27. (original) The process of claim 26 wherein the metal hydrogenation component is at least one Group 9 or 10 noble metal.

28. (currently amended) A process for catalytically dewaxing a mineral hydrocarbon feed containing at least about 15 wt.% wax, based on hydrocarbon feed, which comprises:

(a) contacting a dewaxing catalyst which functions by isomerizing waxy molecules and which contains at least one molecular sieve containing at least one 10 or 12 ring channel with a stream containing at least about 100 wppm to 10000 wppm, measured as oxygen, of at least one alcohol, carboxylic acid, ester, aldehyde, ketone or

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ether at a temperature of from 120 to 400°C and a hydrogen pressure of from 101 to 20786 kPa wherein the catalyst is selectively activated; and

(b) contacting the catalyst from step (a) with the hydrocarbon feed and dewaxing the hydrocarbon feed under conditions effective to catalytically dewax the hydrocarbon feed.

29. (original) The process of claim 28 wherein the molecular sieve is at least one of ZSM-5, ZSM-11, ZSM-22, ZSM-23, ZSM-35, ZSM-48, ZSM-57, ferrierite, EU-1, NU-87, SAPO-11, SAPO-41, ITQ-13 or MCM-71.

30. (original) The process of claim 28 wherein the molecular sieve is at least one of zeolite beta, ZSM-12, MCM-68, SAPO-5, SAPO-31, MAPO-36, ZSM-18, offretite, mordenite or faujasite.

31. (original) The process of claim 29 wherein the 10 ring molecular sieve is ZSM-48.

32. (original) The process of claim 28 wherein the conditions effective to catalytically dewax the feed include a temperature of from 250 to 400°C, a pressure of from 791 to 20786 kPa, a liquid hourly space velocity of from 0.1 to 10 hr⁻¹ and a treat gas rate of from 45 to 1780 m³/m³.

33. (original) The process of claim 28 wherein catalytic dewaxing of hydrocarbon feed results in improved yield of isomerate boiling in the lube oil range at equivalent pour over the dewaxing catalyst without oxygenate treatment.

34. (original) The process of claim 33 wherein the improved yield is at least 4 relative percent.

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35. (original) The process of claim 28 wherein the dewaxing catalyst is sulfided, reduced, or sulfided and reduced.

36. (original) The process of claim 28 wherein the dewaxing catalyst bears a metal hydrogenation component.

37. (original) The process of claim 36 wherein the metal hydrogenation component is at least one Group 9 or 10 noble metal.

38. (currently amended) A process for catalytically dewaxing a mineral hydrocarbon feed containing at least 15 wt.% wax, based on hydrocarbon feed, which comprises:

(a) hydrotreating the hydrocarbon feed in the presence of a hydrotreating catalyst under effective conditions effective to hydrotreat the feed to produce a hydrotreated feed and sulfur- and nitrogen-containing contaminants;

(b) separating the hydrotreated feed from the sulfur- and nitrogen-containing contaminants;

(c) contacting a dewaxing catalyst which functions by isomerizing waxy molecules and which contains at least one molecular sieve containing at least one 10 or 12 ring channel by contacting the dewaxing catalyst with a stream containing 100 wppm to 10000 wppm, measured as oxygen, of at least one alcohol, carboxylic acid, ester, aldehyde, ketone or ether at a temperature of from 120 to 400 °C and a hydrogen pressure of from 101 to 20786 kPa wherein the catalyst is selectively activated; and

(d) contacting hydrotreated feed from step (b) with activated catalyst from step (c) under conditions effective to catalytically dewax the hydrotreated feed.

39. (original) The process of claim 38 wherein the molecular sieve is at least one of ZSM-5, ZSM-11, ZSM-22, ZSM-23, ZSM-35, ZSM-48, ZSM-57, ferrierite, EU-1, NU-87, SAPO-11, SAPO-41, ITQ-13 or MCM-71.

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40. (original) The process of claim 38 wherein the molecular sieve is at least one of zeolite beta, ZSM-12, MCM-68, SAPO-5, SAPO-31, MAPO-36, ZSM-18, offretite, mordenite or faujasite.

41. (original) The process of claim 39 wherein molecular sieve is ZSM-48.

42. (original) The process of claim 38 wherein catalytic dewaxing of hydrocarbon feed results in improved yield of isomerate boiling in the lube oil range at equivalent pour over the dewaxing catalyst without oxygenate treatment.

43. (original) The process of claim 42 wherein the improved yield is at least 4 relative percent.

44. (original) The process of claim 38 wherein the conditions effective to catalytically dewax the feed include a temperature of from 250 to 400°C, a pressure of from 791 to 20786 kPa, a liquid hourly space velocity of from 0.1 to 10 hr⁻¹ and a treat gas rate of from 45 to 1780 m³/m³.

45. (original) The process of claim 28 wherein the dewaxing catalyst is sulfided, reduced, or sulfided and reduced.

46. (original) The process of claim 28 wherein the dewaxing catalyst bears a metal hydrogenation component.

47. (original) The process of claim 36 wherein the metal hydrogenation component is at least one Group 9 or 10 noble metal.

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48. (currently amended) A process for catalytically dewaxing a mineral hydrocarbon feed containing at least about 15 wt.% wax, based on hydrocarbon feed, which comprises:

(a) contacting a dewaxing catalyst which functions by isomerizing waxy molecules and which contains at least one molecular sieve containing at least one 10 or 12 ring channel with a stream containing at least about 100 wppm to 10000 wppm, measured as oxygen, of water at a temperature of from 120 to 400 °C and a hydrogen pressure of from 101 to 20786 kPa wherein the catalyst is selectively activated; and

(b) contacting the catalyst from step (a) with hydrocarbon feed and dewaxing the hydrocarbon feed under conditions effective to catalytically dewax the feed.

49. (currently amended) A process for catalytically dewaxing a mineral hydrocarbon feed containing at least about 15 wt.% wax, based on hydrocarbon feed, which comprises:

(a) contacting a dewaxing catalyst which functions by isomerizing waxy molecules and which is ZSM-48 with a stream containing at least about 100 wppm to 10000 wppm, measured as oxygen, of at least one alcohol, carboxylic acid, ester, aldehyde, ketone or ether at a temperature of from 120 to 400 °C and a hydrogen pressure of from 101 to 20786 kPa wherein the catalyst is selectively activated; and

(b) contacting the catalyst from step (a) with the hydrocarbon feed and dewaxing the hydrocarbon feed under conditions effective to catalytically dewax the hydrocarbon feed.

50. (original) The process of claim 49 wherein the conditions effective to catalytically dewax the feed include a temperature of from 250 to 400°C, a pressure of from 791 to 20786 kPa, a liquid hourly space velocity of from 0.1 to 10 hr⁻¹ and a treat gas rate of from 45 to 1780 m³/m³.

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51. (original) The process of claim 49 wherein catalytic dewaxing of feed results in improved yield of isomerate boiling in the lube oil range at equivalent pour over the dewaxing catalyst without oxygenate treatment.

52. (original) The process of claim 51 wherein the improved yield is at least 4 relative percent.

53. (original) The process of claim 49 wherein the dewaxing catalyst is sulfided, reduced, or sulfided and reduced.

54. (original) The process of claim 49 wherein the dewaxing catalyst bears a metal hydrogenation component.

55. (original) The process of claim 54 wherein the metal hydrogenation component is at least one Group 9 or 10 noble metal.

56. (currently amended) A process for catalytically dewaxing a Fischer-Tropsch wax containing greater than 0.5 wppm sulfur, based on Fischer-Tropsch wax, which comprises:

(a) contacting a dewaxing catalyst which functions by isomerizing waxy molecules which is at least one molecular sieve containing at least one 10 or 12 ring channel with a stream containing at least about 100 wppm to 10000 wppm, measured as oxygen, of at least one oxygenate at a temperature of from 120 to 400 °C, a hydrogen pressure of from 791 to 20786 kPa wherein the catalyst is selectively activated; and

(b) contacting the catalyst from step (a) with the Fischer-Tropsch wax and dewaxing the Fischer-Tropsch wax under conditions effective to catalytically dewax the Fischer-Tropsch wax.

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57. (original) The process of claim 56 wherein the molecular sieve is at least one of ZSM-5, ZSM-11, ZSM-22, ZSM-23, ZSM-35, ZSM-48, ZSM-57, ferrierite, EU-1, NU-87, SAPO-11, SAPO-41, ITQ-13 or MCM-71.

58. (original) The process of claim 56 wherein the molecular sieve is at least one of zeolite beta, ZSM-12, MCM-68, SAPO-5, SAPO-31, MAPO-36, ZSM-18, offretite, mordenite or faujasite.

59. (original) The process of claim 57 wherein the molecular sieve is ZSM-48.

60. (original) The process of claim 56 wherein the conditions effective to catalytically dewax the feed include a temperature of from 250 to 400°C, a pressure of from 791 to 20786 kPa, a liquid hourly space velocity of from 0.1 to 10 hr⁻¹ and a treat gas rate of from 45 to 1780 m³/m³.

61. (original) The process of claim 56 wherein catalytic dewaxing of a Fischer-Tropsch wax results in improved yield of isomerase boiling in the lube oil range at equivalent pour over the dewaxing catalyst without oxygenate treatment.

62. (original) The process of claim 61 wherein the improved yield is at least 4 relative percent.

63. (original) The process of claim 56 wherein the oxygenate is at least one alcohol, carboxylic acid, ester, aldehyde, ketone or ether.

64. (original) The process of claim 56 wherein the oxygenate is water.

65. (original) The process of claim 56 wherein the dewaxing catalyst is sulfided, reduced, or sulfided and reduced.

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66. (original) The process of claim 56 wherein the dewaxing catalyst bears a metal hydrogenation component.

67. (original) The process of claim 67 wherein the metal hydrogenation component is at least one Group 9 or 10 noble metal.

68. (original) The process of claim 56 wherein the Fischer-Tropsch wax is hydrotreated prior to step (a).